

Q1. Similarity Between Snake River and Lower Columbia River Populations

Uncertainties/Issues

- if stocks in two subregions have similar survival in estuary / ocean, then:

Regional differences in overall survival (R/S) mainly due to migratory corridor conditions and productivity differences.

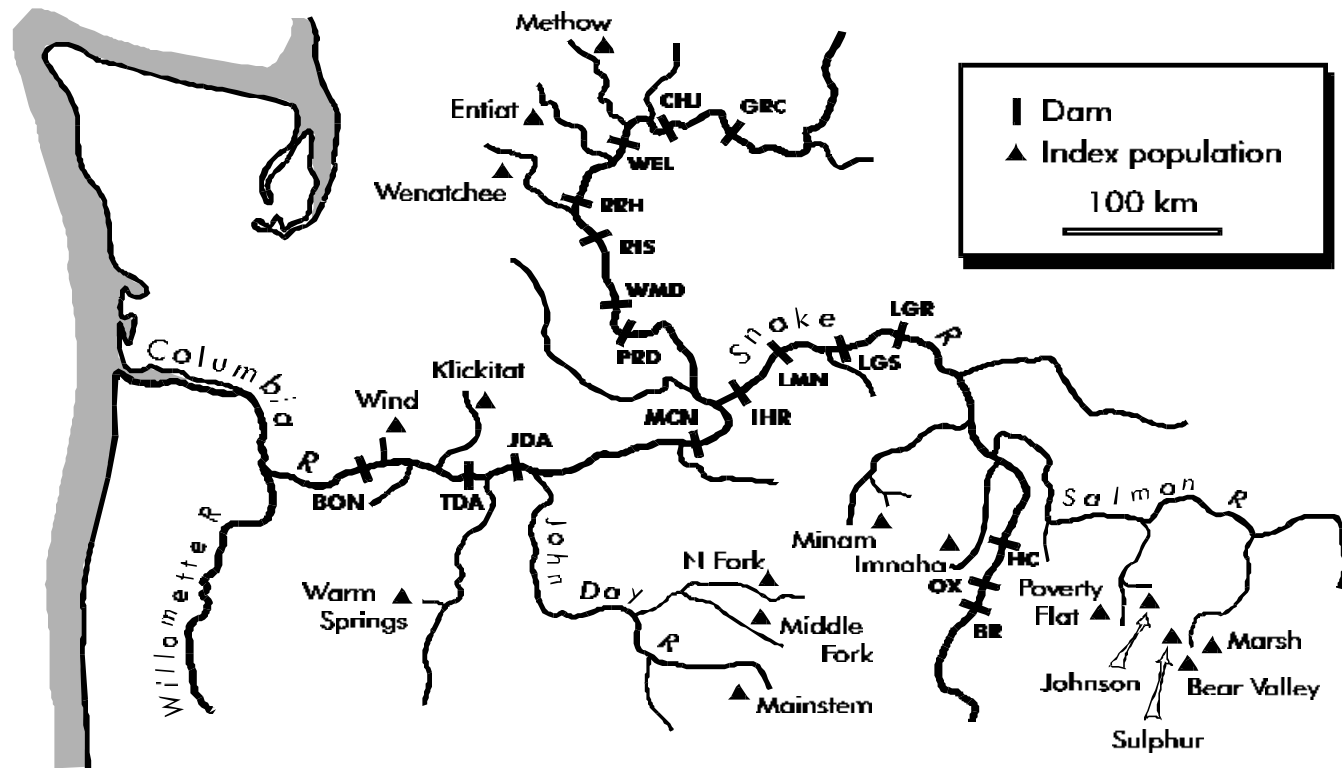
Extra mortality unique to Snake River stocks is smaller.

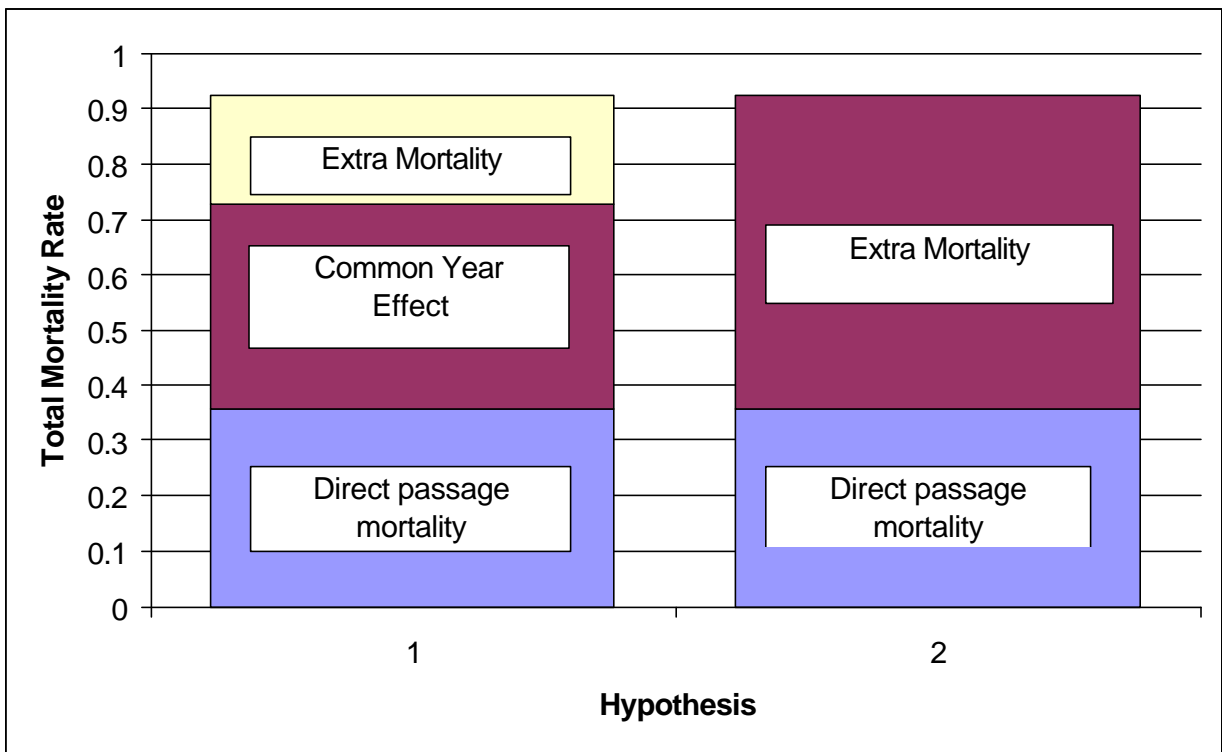
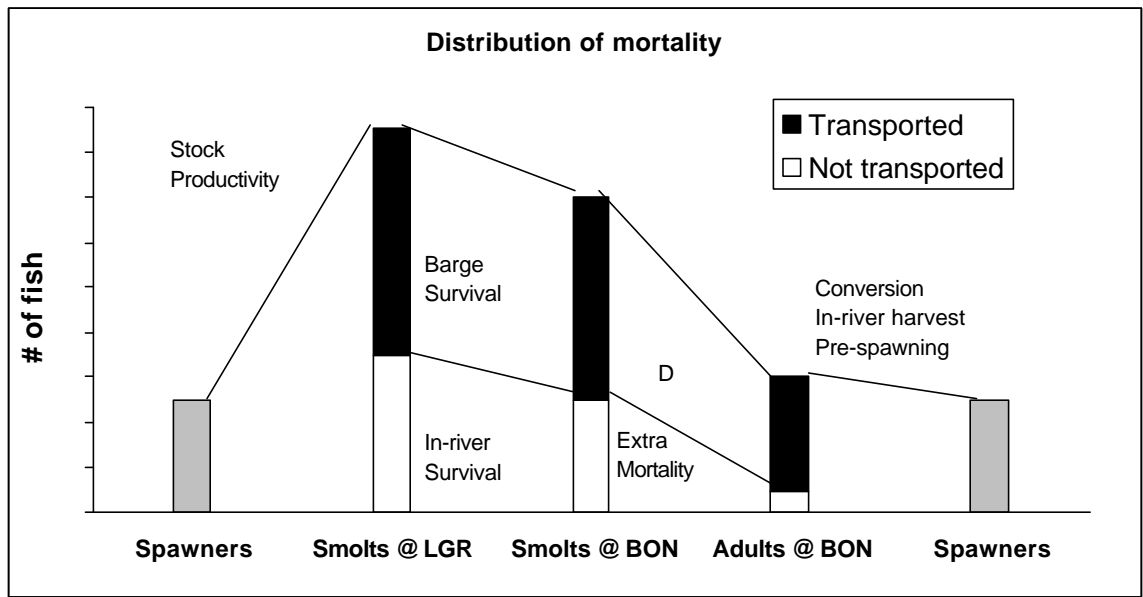
- if stocks in two subregions have different survival in estuary / ocean, then:

Differing sensitivities to climate/ocean conditions may play greater role in regional differences in overall survival.

Extra mortality unique to Snake River stocks is larger.

Index stocks of spring/summer chinook salmon



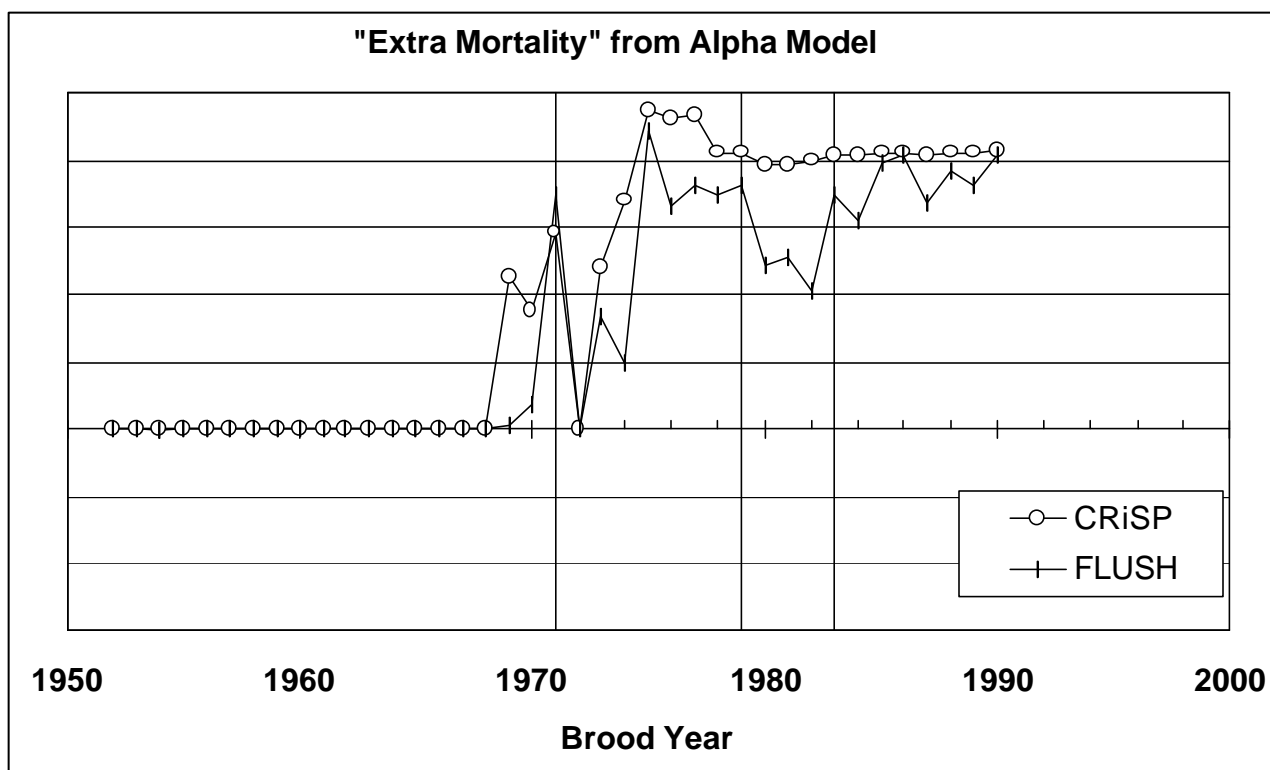
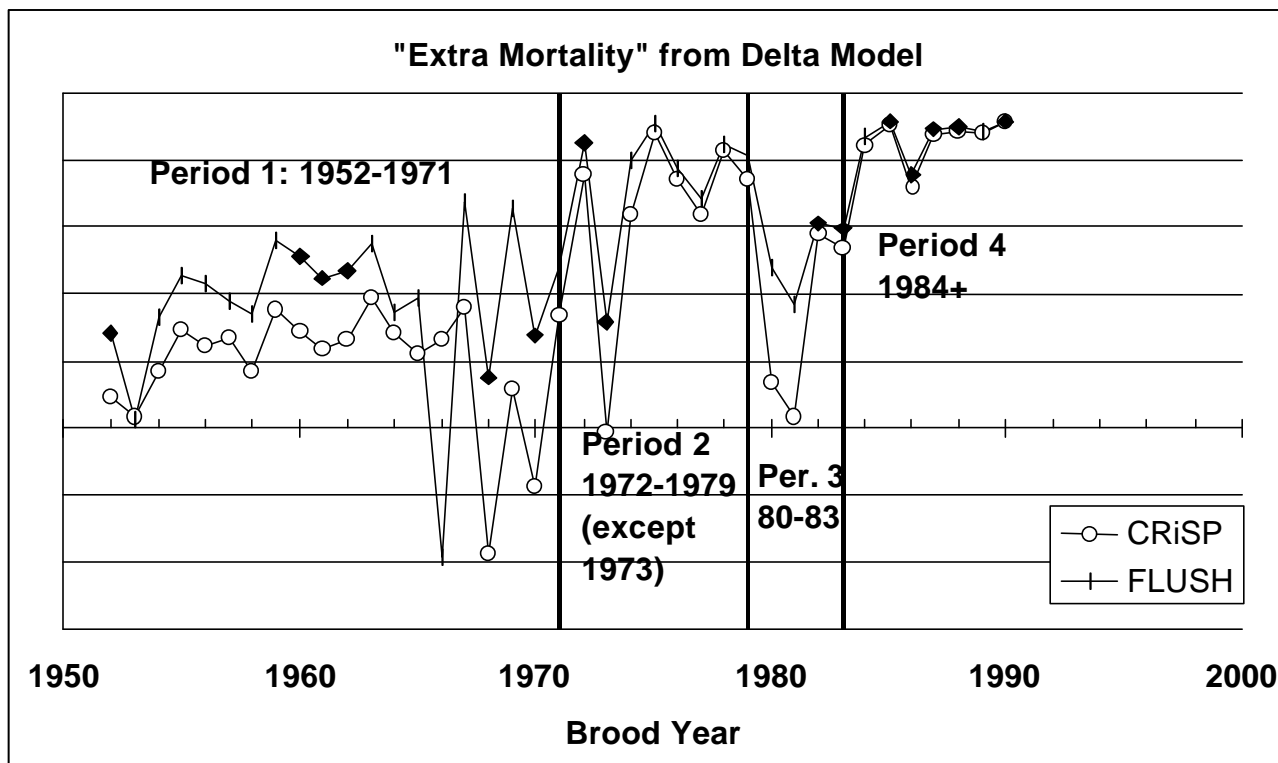


Implementation

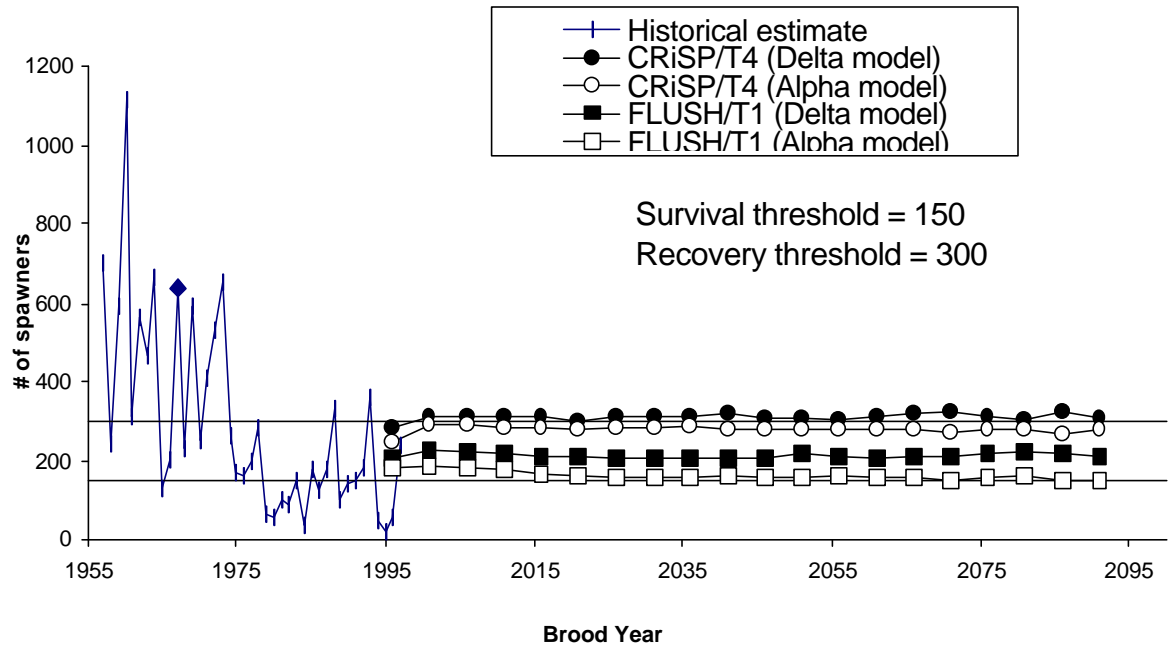
Upstream and downstream stocks have:	<i>H1. Common effects included (Delta approach)</i>	<i>H2. Common effects excluded (Alpha approach)</i>
similar	estuarine / ocean survival	
different	passage survival productivity carrying capacity	passage survival productivity carrying capacity estuarine / ocean survival sensitivity to changes in climate regime

Implications:

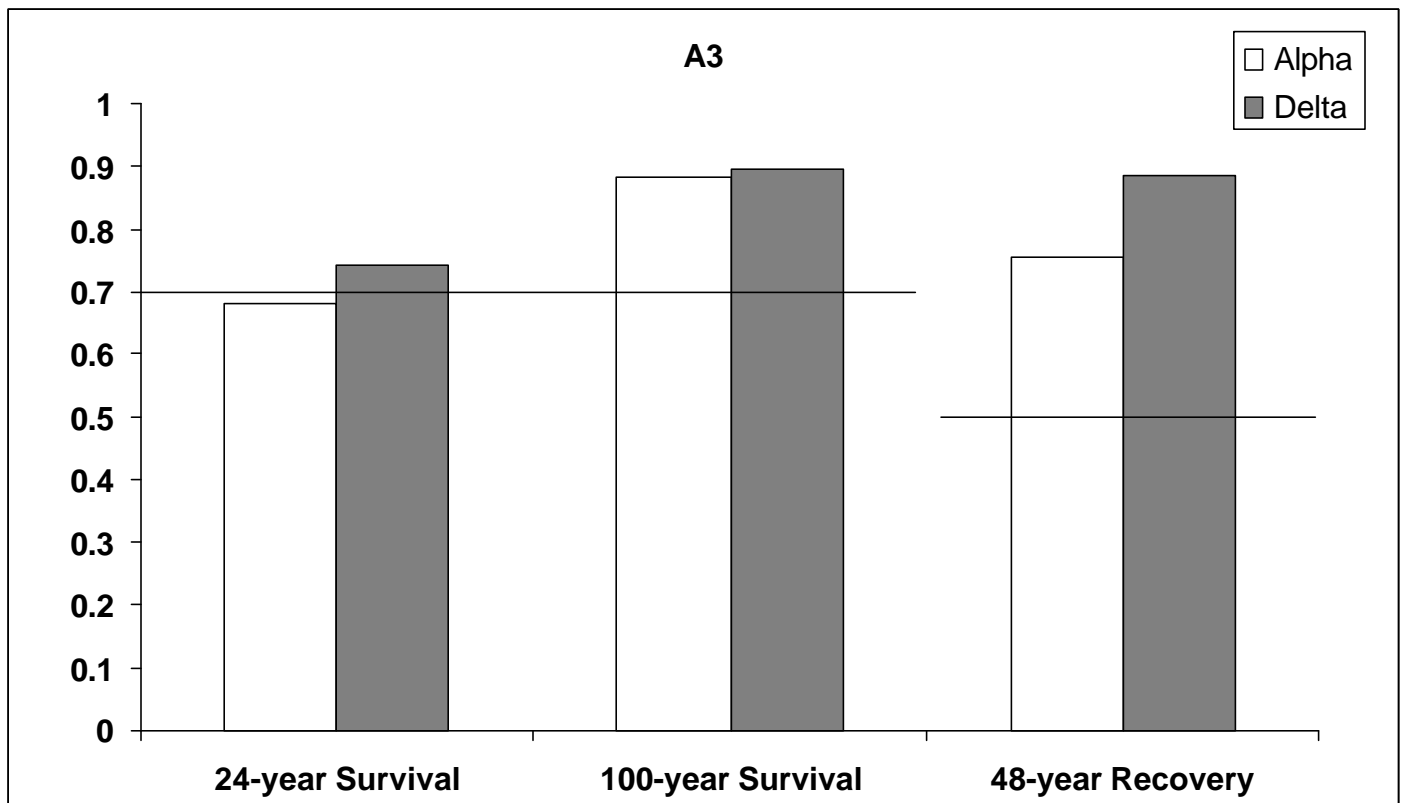
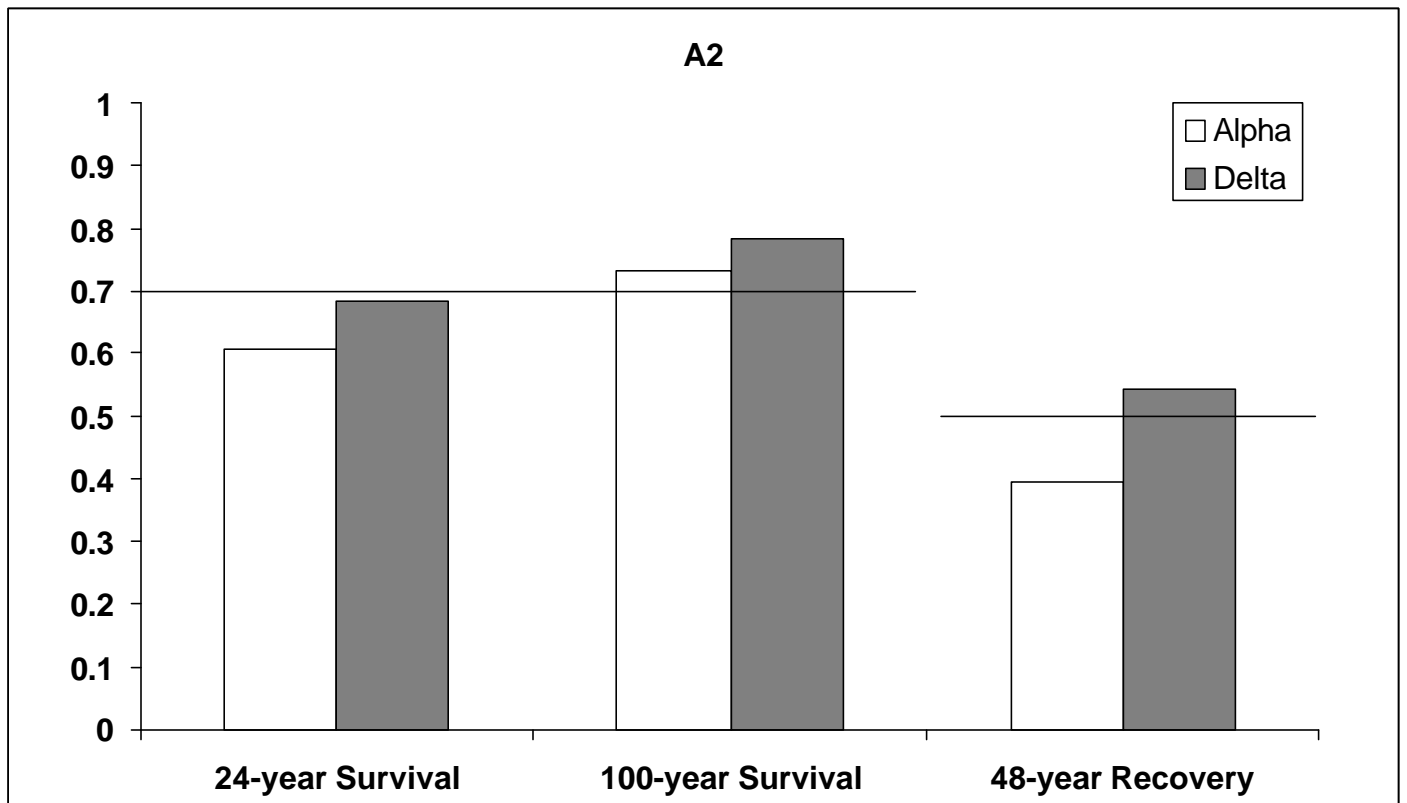
- Alpha approach shows step change in extra mortality of Snake River stocks, while Delta shows more gradual change (similar under both CRiSP and FLUSH)
- with Delta approach, Snake River stocks have higher projected escapements, and higher probabilities of survival and recovery under all actions (vs. Alpha)



**Median Projected Johnson Creek Spawners
(A1, BKD extra mortality /Markov future climate hypothesis)**



Effects on NMFS Standards



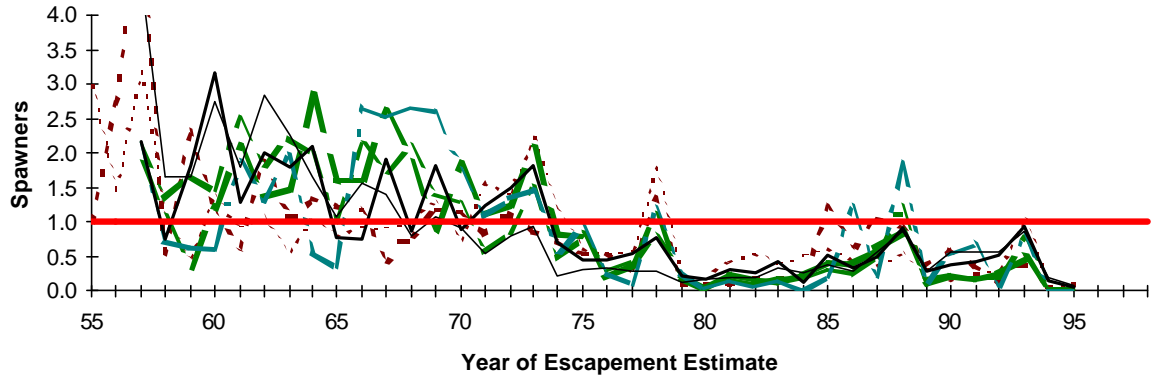
Evidence related to Delta approach (common effects)¹:

- upstream and downstream stocks do show common fluctuations over time
 - Ohds: patterns of changes in escapement in upstream and downstream stocks; common year effect
- upstream and downstream stocks all arrive in estuary around late April and May, share common estuarine and ocean conditions
 - ⇒ *coincident timing may no longer occur due to transportation*
- early life history has major impacts on spring-summer chinook (little harvest; adult returns predicted by jacks)
 - ⇒ *ratio of adults:jacks changes from year to year*
- Delta approach fits spawner-recruit and SAR data “decisively” better than Alpha approach, regardless of which passage model used
 - ⇒ *Delta approach based on S-R data (not independent)*
- wild, Fraser River spring-summer chinook (12 stocks over 350 mile stretch) showed strong common patterns in escapement from 1974 to 1991
 - ⇒ *major changes in harvest affected pattern*

¹ WOE report: pgs. 29 to 33; 52 to 70.

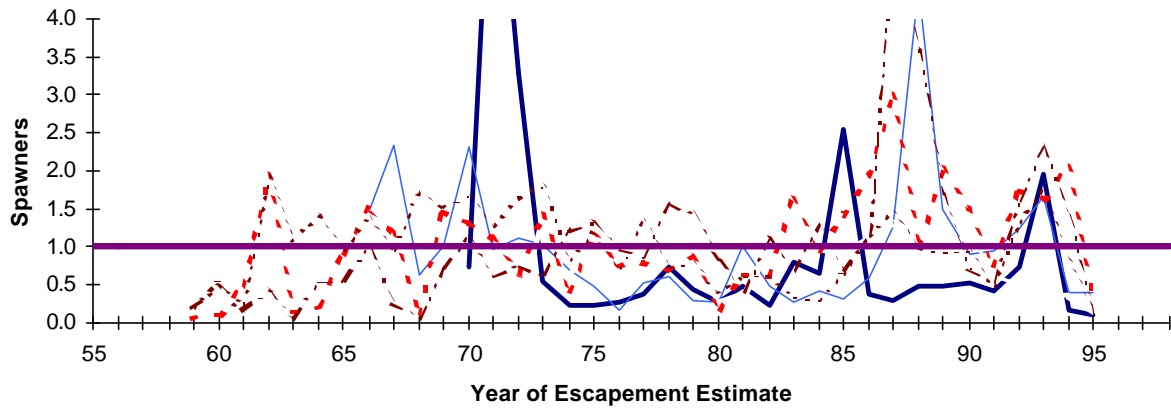
Snake River Stocks

- - - Minam River - - - Imnaha River - - - Bear Valley/Elk Creek - - - Marsh Creek
 - - - Sulphur Creek - - - Poverty Flats - - - Johnson Creek - - - Average Escapement

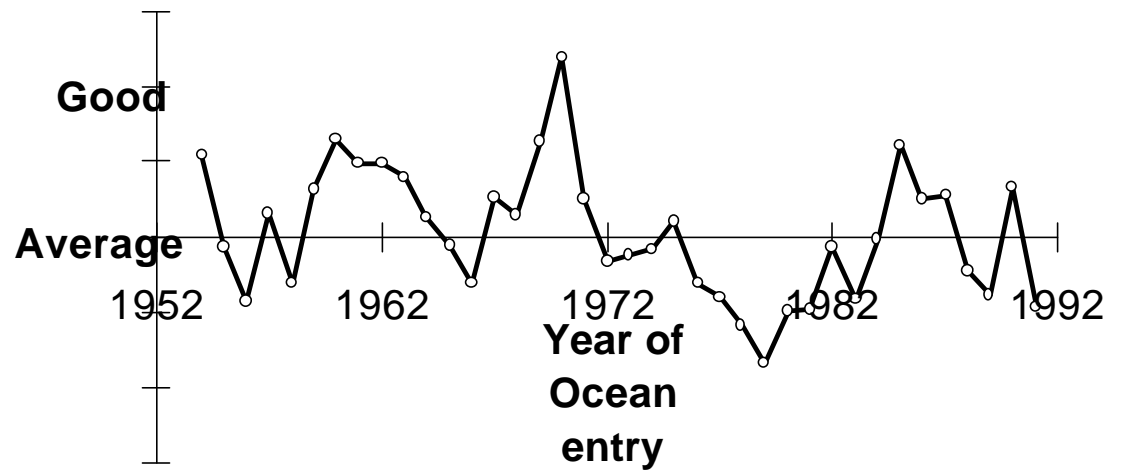


Lower Columbia River Stocks

- - - Wind River - - - Klickitat River - - - Warm Springs River - - - John Day R. Mnstm.
 - - - John Day R. Mid. Fork - - - John Day R. NF/G.Ck. - - - Average Escapement



Climate Conditions (Common Year Effects) 1954-1991



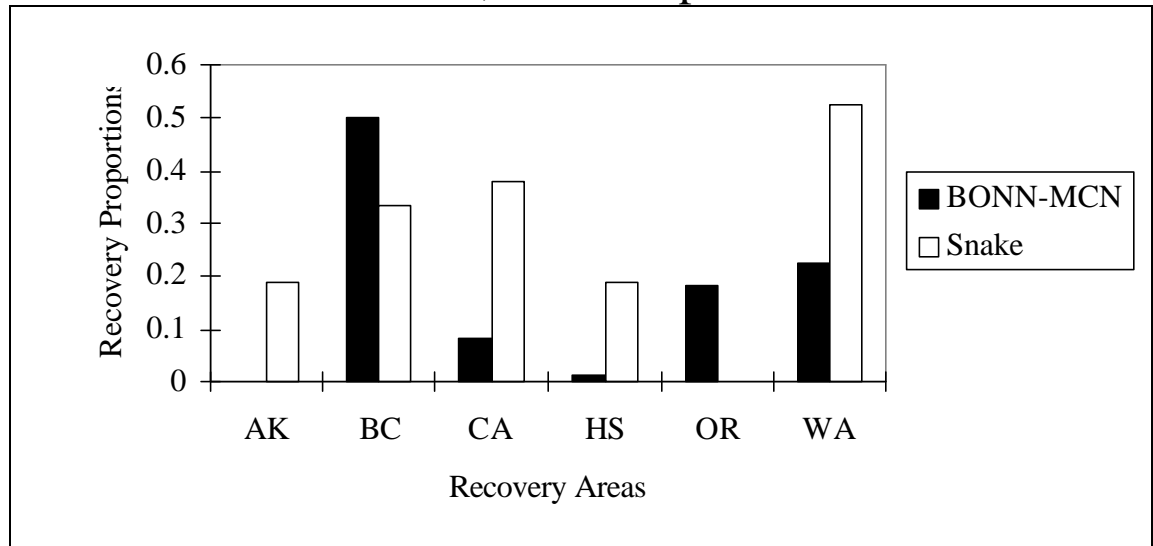
Evidence related to Alpha approach²:

- two stock groups are genetically distinct and considered by NMFS to be in different Evolutionarily Significant Units
 - ⇒ *genetically distinct stocks often show common patterns of survival*
- greater distances and elevations that Snake River fish must traverse could lead to different physiology and endocrine systems (Saila, SRP)
- Snake River stocks more likely to return at age 5 than age 4, giving ocean mortality more time to affect fish
 - ⇒ *in sockeye, year of ocean entry has stronger effect on survival than brood year*
- coded wire tag data suggest ocean distributions of Snake River chinook quite possibly different from lower Columbia stocks; Snake River stocks more likely to be found in California current, with worse conditions
 - ⇒ *same data can be analyzed to show no difference*
 - ⇒ *CWT evidence has low power; should be discarded*
 - ⇒ *survival could be similar even if distributions aren't*

² WOE report: pgs. 29 to 33; 52 to 70.

- Two analyses of CWT data:

Paulsen and Fisher 1997; FY97 Report:



Weber et al. 1997 (Prelim. Dec. Analysis):

